

SPECIFICATION,

Of the manner of Re-building the LOCKS, on the Welland Canal.

Lock Pit.—To be excavated of such length, width, depth and slopes, as may be required by the Chief Engineer in the employ of the Canal Commissioners, for the time being; and the bottom made smooth and level, so as to give a firm and uniform bearing to the foundation timbers. Care shall be taken not to jeopardize the safety or use of the canal, or of any works that may be adjoining the location for the lock; and where required, such timber, plank or piles, shall be procured and put in, to secure the adjoining works, and the canal; also, to construct such bridges, or other works, as may be necessary to secure and accommodate the navigation of the canal, during the re-construction of the locks, as said Engineer may direct.

Foundation.—If the bottom be of earth, which, in the opinion of the said Engineer, is not sufficiently firm to support the foundation, then bearing piles of hard wood, from 11 to 14 inches in diameter, and of such length as the aforesaid Engineer may require, shall be driven, to support the foundation. Each pile shall be shod with a wrought iron shoe, of such form as the aforesaid Engineer may direct, the head being bound with a wrought iron band three inches deep, and half an inch thick. The piles shall be driven with a hammer weighing not less than one thousand pounds, until ten blows of the hammer shall cause no further penetration of the pile.

The heads of the piles to be cut off smooth and level, to receive the foundation timbers, which, in this case, are to be twelve inches square, of sufficient length to cover the outside piles, and to be treenailed with a two inch white oak treenail, 24 inches long, in each pile. The quantity of piling required in each particular case, will be determined by the Chief Engineer.

If the bottom be of earth not requiring bearing piles to be driven, the foundation shall be composed of timber, 12 inches thick, and not less than 10 inches wide, counter-hewed on the upper side, to be placed at uniform distances, so as to cover at least three-fourths (and four-fifths, if required,) of the area of the foundation: under the lower mitre sill, the timbers are to be placed side by side. In all cases, the timbers are to extend six inches beyond the extreme limit of the foundation walls. The timbers under the lower mitre sill, to be of white oak; and the other foundation and apron timbers, to be of white oak, hemlock or pine timber. The spaces between the timbers, in all cases, are to be filled with concrete masonry.

In cases where a rocky bottom is found, the foundation timbers shall be 10 inches thick under the lower mitre sill, and 8 inches thick elsewhere, placed at such distances apart as may be directed, and laid in hydraulic mortar: the spaces between the timbers, to be filled with concrete masonry.

Sheet Piling.—In all cases where rock does not occur, there shall be a course, of from 4 to 6 feet deep, as may be required, under the lower mitre sill, above the floor of the upper recess, and at the tail of the apron to the lower gate—in each case to extend across the whole foundation. The sheet piling to consist of two courses of two inch pine plank, the edges neatly fitted, and the two courses breaking joint properly. Ditches to be excavated to receive the sheet piling, which, at the top, is to be well spiked to the foundation timber. The spaces excavated as above, to be filled up with fine hard gravel, well puddled, and water tight.

Flooring.—A course of three inch pine plank to be laid over the whole foundation timbers, except a streak three feet wide under the face of each wall, which shall be covered with three inch white oak plank: the whole to be well jointed, and treenailed, with two white oak treenails at each end, and at every three feet in length, to enter the timber at least five inches, and to fill an inch and a quarter bore. The floor plank in the chamber of the lock, and other parts where a lining is to be laid, and for three feet under the walls, shall be sized true and even, to form a close and uniform support to the lining plank. On this floor, the superstructure is to be erected.

Mitre Sills.—To be of best white oak timber, framed and secured with iron straps, as shewn on the plan—to be well jointed and bolted to the foundation or platform timbers, with iron bolts, 19 inches long, and one inch square, well ragged and headed, as shewn on the plans. The upper mitre sills to be of stone, as shewn on the plans.

Masonry.—The stone to be taken from the quarries selected by the aforesaid Engineer. The face stone to be rough hammered on the face, and the horizontal beds to be cut true and even, the upper and lower faces parallel to each other; the end joints to be also parallel the full breadth of the stone. The cutting to be done, and the work laid, with a joint that shall not exceed one quarter of an inch in thickness.

The lower course of the face stone, shall be two feet wide on the top; the second course shall be three feet wide, and shall break joints at least one foot on the stone back of the face stone. In the second course, there shall be a header, of two and a half feet in length on the wall, extending back into the wall five feet; one in every ten feet of the wall. The length of the stretchers shall be not less than 3 feet, on the face of the wall. The face of the wall shall be made of such alternate courses, to the coping. The stone shall be laid in courses of not less than twelve or more than thirty inches thick; each course shall be of a uniform thickness, and each stone shall break joint, at least twelve inches, with the stone on which it rests. In the bed of the stone, there may be depressions not exceeding six inches in diameter, and one quarter of an inch in depth.

The backing shall be laid in courses corresponding with the front, with similar headers in the first and alternate courses, and placed as nearly as may be equally distant on each side, from the headers in the front. Each stone shall be dressed to regular forms, and break joints at least 6 inches, with the stone on which they rest. All the stone shall have beds of at least four feet area; and opposite the front headers, they shall fill the space to the rear of the wall. The beds shall be dressed to half an inch joint, and the interior vertical joints to one inch—all exterior vertical joints being dressed to a quarter of an inch. No stone less than six inches thick, shall be used in the backing.

Coping.—The walls are to be coped with cut stone, of a uniform thickness, not less than eighteen inches, to conform to the bevells of the walls, and to extend backwards from the face, five feet. Each coping stone to be secured to the adjoining ones, with two clamps; each clamp to be nine inches long, two inches wide, and three-fourths of an inch in thickness, let into the stone so as to make a smooth top, and well secured with lead. The inside upper corner of the coping, in the chamber of the lock, to be finished with a round corner, of three inches radius; in other respects, the stone to be cut to a straight line on all its sides.

Quoins.—The quoin stone for the heel post of the gate to turn in, shall not be less than four and a half feet in length, in the line of the chamber, and to be cut and formed to a curve of eight inches radius; the nose to be finished with a round corner, and the heel

with a bevel running to the rear of the recess. The quoin stones to be laid alternately header and stretcher.

Cement.—All the stone shall be well and closely laid in mortar, made of the best quality of water lime and clean sharp sand, in equal proportions; and the vertical joints shall be well filled with grout, of similar materials. The grouting to be completed with every course of masonry, and no small stones are to be filled in, until after the grouting is in. The work shall be kept wet, and free from all dirt that may prevent the cement from adhering well to the stone. No cement shall be used, in any part of the work, until the same shall have been examined and approved of, by the Chief Engineer.

Method of carrying up the Masonry.—The whole to be laid up in regular courses, and in no case shall there be more than two unfinished courses. The face and other stone shall be properly fitted to their places, and then raised, and after the mortar is laid on, lowered to their beds so as to insure a uniform mortar joint. Cranes shall be used in handling the stone about and on the walls, to enable the workmen to properly lay them; and also, to prevent their injuring the wall that may have been laid.

Second Flooring.—Of seasoned two inch first quality white pine plank, well jointed and laid on the foundation between the walls, from the breast wall to the lower end of the main wall—to be closely and firmly jointed to the mitre sill and walls, so as to make a water tight flooring. The end joints to come to the centre of a foundation timber; each plank treenailed with two white oak treenails at each end, and at every three feet intermediate; the treenails to be 10 inches long, and of suitable size to follow an inch and a quarter bore.

Gates.—To be made of the best quality of white oak timber, well planed; the cross bars and braces to be framed into the heel and toe posts with double tenons, and secured with wrought iron Ts, well bolted. The heel and toe posts shall be framed to the balance beam, by double tenons, and secured by a wrought iron strap. The pivots and sockets which support the heel posts, to be of the best cast iron. The form and dimensions of the timber and iron, shall be agreeably to the directions of the aforesaid Engineer. The gates to be planked with first quality two inch pine plank, well jointed, grooved and tongued, the tongues to be of white oak, and to be put in with white lead: the plank to be secured with 5½ inch spikes.

Embankments.—The outside bank to be 20 feet wide on the top, and have a slope on the outside of two feet horizontal to one vertical, and finished level with the top of the walls. The embankment shall, in the progress of the work, be kept one foot below the unfinished wall. The form of the embankments will be shewn on the working drawings furnished by the Engineer.

Snubbing Posts.—There shall be six white oak snubbing posts at each lock, of such dimensions, and placed in such positions, as the said Engineer may direct.

For a more full and perfect explanation of the form, and dimensions of materials and parts, and of the manner of constructing the locks, in all their details, plans, with bills of timber, will be furnished by the aforesaid Engineer; who will also give such directions, from time to time, during the progress of the work, as may appear to him necessary and proper, in order to make the work, in every respect, complete and perfect, on the plan contemplated in the above specifications. And the said plans, bills of timber, and directions, shall in every respect be complied with.

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**SPECIFICATION,
OF THE MASONRY IN THE WASTE WEIRS.**

The face of the wall to be of rough hammered stone, with horizontal and vertical joints to the full depth of the stone, not exceeding a quarter of an inch. The face stone to be laid in hydraulic cement, and the vertical joints to be afterwards carefully filled with grout, of similar materials.

No stone to be used in the face, containing less than twelve cubic feet; the backing courses to be of good rubble masonry, laid in mortar composed of the best stone lime and sharp sand, in such proportions as the Engineer may direct.

These walls will be built on foundations similar to those specified for the locks; and at the back of the wall, an embankment of puddle is to be formed, from 3 to 5 feet thick.

MEMORANDUM.

All earth necessarily excavated for the building of the locks, and to form the requisite berm and towing path banks; to make room for lining or puddling; or to form a suitable foundation for banks, puddle wall, slope wall, or for permanent back drains, shall be measured and allowed for, as excavation: and in cases where earth necessarily excavated, is not removed more than one hundred feet, in a longitudinal direction, or parallel with the line of the canal, to form the adjoining bank or banks, no allowance for embankment shall be made.

The prices inserted in the Tenders, are to be in full compensation for all the materials and labour required to put the same into the work, and complete the same in every particular, in accordance with the plan and specifications deposited in the Office of the Welland Canal Company, at St. Catharines.